Neogyps errans

Neogyps errans

Neogyps errans, Miller, Univ. Calif. Publ. Bull. Dept. Geol., vol. 9, No. 9, p. 108, 1916.

To date Neogyps has been described only from the tarso-metatarsus and on the basis of characters of this bone has been assigned to the family Vulturidae, with closest resemblance to Gypaetus barbatus (loc. cit. [Miller, 1916] p. 109).

The present study of this bird has included all of the principal elements of the skeleton. The tibio-tarsus and femur were easily recognized as belonging to this genus, both because of size and of characters. The [illegible] pelvis, sternum, shoulder girdle and wing bones could on the basis of size be grouped together as representing one species, but there were no [illegible] identified as Neogyps. A similar group of elements of smaller size were also present in the Pleistocene beds of the Carpinteria asphalt and the writer is inclined to associate them with Neogyps (?) The only other species with which they could belong were G. grinnelli and M. woodwardi. (Vulturogyps dagystes?) M. woodwardi was excluded on the basis of relative abundance of material, M. woodwardi being of less frequent occurrence than N. errans or G. grinnelli, and (2) presence of other bones which appeared undoubtedly to belong to M. woodwardi; (2) G. grinnelli was eliminated on the basis of (1) the head of the femur is small and does not fit properly into the large acetabulum

of the pelvis, whereas that of Neogyps coincides accurately; (2) the ratio of length of femur to length of humerus is found to in all modern members of the family Vulturidae to fall below 53.1% (Neogyps at 53.0% being the highest) whereas in the Eagles the ratio is over 55.0% and above 65.0% in the Aquila and Geranoaetus; the large humerus if placed with the femur of G. grinnelli would give G. grinnelli a ratio of 55.9% as against 69.9% for modern Geranoaetus, ~~which is~~ on the other hand the smaller humeri placed with Neogyps femur would give Neogyps a ratio of 65.3%; placing the large humerus with G. grinnelli and the large with Neogyps gives the ratios of 52.6% and 69.4% respectively which are in accord with the modern genera to which they are most nearly related; (3) the large coracoid has a position more Vulturid in character than aquilus.

Neophron typs and Neogyps are decidedly dif. types of vultures, the former dissimila to Neophron which by some authors has been put in a separate group from the other vultures, the latter resembling the larger group of vultures and having certain Gypaline chars as well. It is, therefore, not difficult to determine which of the Pleist. ones forms most closely resembles the Miocen. Apparently if Pal. was ancestral to either type it was ancestral to Neogyps.

Lack of med. spine on hypapophysis of 1st dorsal

Long narrow phials of ~~foot~~

Caudals unlike Cy— have no hypapophyses

Meas of typ Pal		Cy.	Neotyp	Une	Gyp	Neophron Gr
length (cent. just)	0.00 7.0	11.4	7.8	6.7	11.1	8.2 Ne.8
width ant.	0.00 5.0	9.4	6.6	5.2	7.7	9.5 Gp.3
width post	0.00 6.5					
Depth hypapophysis	0.00 5.0	6.6	6.8	4.3	11.4	4.1 6.2

3.5

No closer to Hal

Nostrum Neogyps

624
523
5.1

~~Hal's Supplement~~

There are but few chars. of this element which would serve at all times to distinguish the aegypius from the eagles. ~~The~~ The narrow, vertically placed ext. nasal openings are peculiar chas. of the vultures, ~~they are~~ that the larger opening similar to eagles is also found in ~~this~~ grup.

The rostrum of the vultures is apparently constraint in rel. greater length and less breadth than in the ~~eagles~~, And the char- which ~~of~~ seems to be chal. of the vultures as disting. from the eagle is that ~~the~~ the ~~ant~~ anterior ~~the~~ tomia is on a line with the ~~slightly~~ below the inferior border of the nasal opening

The rostrum of Neogyps ~~narrow~~ but ~~in breadth~~ but the ~~vultures~~ eagles nor as narrow as in the vultures, being deeper & Halia Urus. The tomia is decidedly lower than the inf. border of the nares.

Tomia nearly straight - ~~with a slight~~ ~~curvature~~ upward curve antly. Hook of beak descends abruptly. Contour of tomia & angle of beak about as in Aquila

Rostrum Neogyps.

Nasal opening large ~~oval~~ & elongate.
Not a small vertical slit as in Sarcogyps & some other vultures. This large type of nasal opening is not peculiar to the eagle however, but is found in Gypaetus & Neophron as well.

The rostrum is high & narrow

Neogyps crania

skull - cranium

	cranium	beak	greatest breadth (a)	depth (c)	breadth (e)
Hal. 291	68.7	42.4	67.4 - 72.2%	48.7 - 53.7%	36.2 - 74.3%
263	67.9	44.3	70.4 - 71.0%	50.0 - 58.3%	41.1 - 82.2%
232	68.1	36.3	67.4 - 72.8%	49.1 - 54.5%	36.3 - 73.9%
224	60.6	41.4	51.7 - 96.7%	50.0 - 64.2%	33.2 - 66.4%
421	70.2	30.2	63.6 - 79.0%	50.3 - 49.5%	31.5 - 62.6%
227			44.5 - 82.9%	36.9 - 71.9%	32.0 - 86.4
233			62.8 - 67.0%	42.1 - 55.0%	34.6 - 82.1
e 1201			71.0 a 67.1%	47.7 - 55.1%	39.2 - 82.1%
e 1196			66.5 a 68.2%	45.4 - 54.1%	36.0 - 79.3%
e 2053			75.4 - 68.2%	47.7 - 54.7%	41.3 - 84.2%

dc: G. mel.; ec: G. mel.; "?"; ed: G. mel.; Gypaetus.

Cranium in Neogyps indented in median central line from ant. end of frontals, past the crown of the skull.

Gypaetus - very faintly concave in median central portion near crown - not extending forward or backward as far as in Neogyps.

"?" - no concavity - about flat

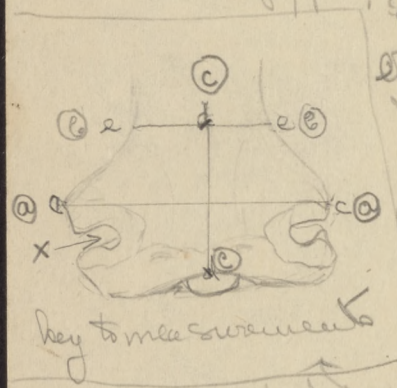
Neogyps - convex

Neophron - General convexity but very faint narrow short depression just ant. to crown.

Aquila - Indented at crown slightly and also a little ant. to crown. Not extensive

Hal. - like Aquila

G. mel - faintly indented at crown. Marked - just like indentation ant. to crown - not extensive.



Space marked "x" above - narrow - and evenly rounded

Aquila - same as Neogyps

Hal - very broad and rounded

Gypaetus - broad and square

"?" Between Neogyps & Hal in breadth - rounded forward

Gypaetus - breadth as in "?" - rounded

Neophron - broad - rounded with longer sides than Hal.

G. mel - Breadth as in "?" - more pointed and short sides long.

Neogyps encans

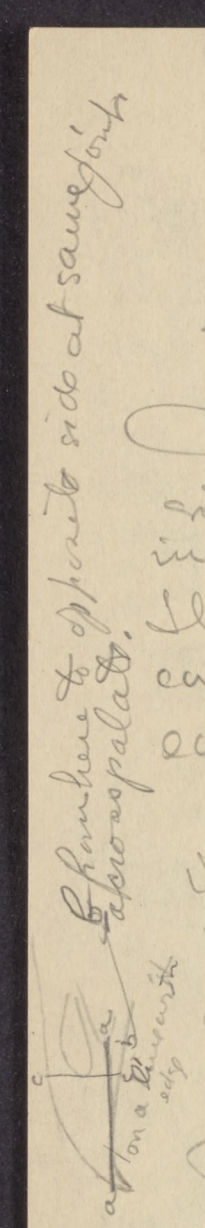
Skull continued. Beak*

Edge of beak nearly straight from nares to curve of rostrum – Neogyps

Gypaetus is straight at ventral side but convex on top as seen in side view.

The other cultures, too are indented at "a" giving concave appearance, whereas Neogyps is like the eagles – Hal, G. mel and Aquila.

External nares – Neogyps and "?" with vertically placed nares – about higher than long, Neophron long and narrow – ant. limit not very defined marked, Gypaetus also long (Neogyps altogether) not so much so as Neophron. Gypaetus is distinguishing from the eagles by region between the nares which is narrower and curved (convex from side to side) This – in the eagles is broad and practically flat, thus placing the dorsal border of the nares higher than in Gypaetus. Neogyps – slightly convex – thus intermediate between Gypaetus + eagles.



	a Length	c Height	b Breadth at same place	Ba
✓263	47.3	19.6-41.4%	24.2	– 51.1%
✓233	28.6	15.8-55.2%	24.2	– 84.2%
✓421	30.7	19.9-64.8%	22.9	– 74.2%
✓291	41.6	26.6-63.9%	28.4	– 68.2%
✓226	42.4	20.4-48.1%	24.3	– 57.3%
#9062	37.0	21.9-56.4%	23.1	– 62.4%
✓1074	36.0	21.8-62.1%	22.6	– 64.5%
✓4615	36.3	22.3-61.4%	22.7	– 62.5
✓J.9063	35.0	20.1-58.1%	22.9	– 64.0
	40.1	6.3-15.7	13.9	– 34.6

On ratio of length to breadth Neogyps is between Haliaëtus and Otogyps – a little nearer Hal.

On ratio of height to length Neogyps is between G. mel and Hal.

In each the above cases Hal. resembles Neogyps more nearly in general aspect than does the other species mentioned (Neogyps – G. mel)

* The other are not complete skulls Dr. Miller has one from the Carpinteria beds which thus proves that the beaks have described belong to the skull described before.

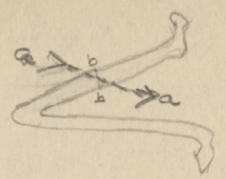
This Ps. in the collection,

Neogyps errans

Skull cont'd - Summary.

Entire skull (cranium and beak) more like the eagles than the Vulturidae. The only characters which are strictly Vulturid which are even verged upon by Neogyps are length of beak and convexity of basal - premaxillary tidy between nares. Even here the Neogyps is intermediate - and resembles Hal. as well. The cranium is closest to G. mel. and Aquila, the beak to Haliaeëtus.

Neogyps errans
mandible



	a breadth	b height	ratio ab
C 697	2.7	9.0	– 33.3%
C 491	2.7	9.3	– 34.4%
Hal 291	3.2	10.6	– 30.1%
?: 232	2.5	10.1	– 24.7%
Ag. 4 21	2.8	9.1	– 30.7%
Gr. 233	2.8	7.6	– 36.8%
263	1.8	14.8	– 12.1%
229	1.6	5.8	– 27.4%
C 2218	3.5	9.0	– 38.8%
224	2.5	11.0	22.7 –
323	2.9	8.3	– 34.9
3263	3.2	9.3	– 34.3
C 233	2.9	9.5	– 30.5

The Vultured mandible is half compared with that of the eagle as seen from the ratios above. The rami are relatively high and thin. In strongness of rami Neogyps is between Ag. & Hal. on one hand and Gen. mel. on the other – (nearer Gen. mel, however.?)

Neogyps errans
Sternum

	Breadth across ventral keps of sulcus ♂ ?		Breadth ♂ ♀ manubrium ratio Ba
232	52.9		11.5 – 21.7%
263	72.1		15.6 – 21.6%
227	38.1		6.9 – 18.1%
32	46.5		6.2 – 13.3%
471	47.2	Aquila	7.4 – 15.6%
233	39.8	Ger. mel	7.1 – 17.8%
226	52.1		9.7 – 18.6%
e9911	48.0		9.4 – 19.6%
e1118	46.4		11.0 – 23.7%
e4136	43.7		9.2 – 21.1%
04385	45.0		9.8 – 21.7

Breadth of manubrium greater than Aquila, Ger. mel. or Haliaetus but as in Vulturidae, particularly ?. and Gypaetus tho there is sufficient variation shown in Neogyps to warrant the supposition of similar variations in them which might make them equal to Neogyps in breadth. Carina of smaller extent below shield- as in Neogyps and ?, but lacking decided upward curve at the anterior end

Sterno-coracoidal fossae long & narrow, unlike Vulturidae in which they are short and broad. also the ventral border in Neogyps is a distinct nearly straight line. The connection between this and the dorsal border being less distinct. The fossa is longer in Aquila & Haliaetus but in Haliaetus the ventral border curves into the costal border and in Aquila the fossa is not broad, and is G. mel. differs in both of these respects.

Vultures G. mel Hal

Neogyps

Neogyps erans

Sternum (continued)

Costal border with six costal ridges. Similar to Aquila, and Gypaetus Neogyps in this, but in Stogyps the border is curved and the sternum of Gypaetus is in general proportions distinct from Neogyps, being very much broader

(No perforations in shield.)

Summary: Characters of Subfamily:

1) Broad manubrium; (2) long carina; (3) carina anteriorly in all but Neophron; (4) short and broad sterno-coracoidal fossa. Those possessed by Neogyps are underlined.

Neogyps coracoid V

Otogyps calvus

		head			
	a length	b prox. Ba	c length	d breadth	da
Miller 226	77.8	44.3 - 56.6%	27.1 - 34.6%	28.4	- 36.2%
LAM. spec.?					
232 left	74.1	40.8 - 55.0%	24.8 - 33.4%	24.3	- 32.7
232 rt	73.8	40.3 - 54.6	24.7 - 33.4%	24.3	32.9
Miller Gypaetus					
263 left	89.1	57.7 - 64.7%	28.7 - 32.2	29.3	- 32.8
263 rt.	88.3	56.8 - 64.3%	28.7 - 32.4	29.5	- 33.4
Miller Neophron					
221 rt.	52.3	28.8 - 55.0%	16.4 - 31.3	16.4	- 31.3
227 left	52.7	28.7 54.4%	16.5 - 31.3	16.1	- 30.5
Neogyps					
C 6648	68.1	38.9 - 57.1%	24.2 - 35.5%	25.6	- 37.5%
C 8145	66.7	38.2 - 57.2%	23.9 - 35.8%	25.0	- 37.4%
C 1981	67.7	38.0 - 56.1%	24.1 - 35.5%	24.8	- 36.6%
C 3330	68.3	39.9 - 58.4%	25.0 - 36.6%	26.0	- 38.0%
C 604	69.8	39.2 - 56.1%	24.9 - 35.6%	25.6	- 36.6%
D 882	69.9	40.4 - 57.7%	24.3 - 34.7%	25.1	- 35.9%
C 3692	67.8	38.3 - 56.4%	23.1 - 37.0%	23.8	- 35.1%
D 2447	68.3	39.9 - 58.4%	24.16 - 36.3%	25.4	- 37.1%
C 4096	65.9	38.3 - 58.1%	23.4 - 35.5%	24.1	- 36.5%
C 3204	69.1	39.7 - 57.4%	24.4 - 35.3%	24.8	- 35.8%
Hal 32	75.2	44.6 - 59.3	25.7 - 34.1	26.6	- 35.0

The coracoid of Neogyps resembles the Vulturidae present in proportionately less length from posterior end of coracoid to furcula. The Sammengeier resembles the eagles in this respect. In measurements Neogyps is closest to Otogyps calvus as is it also in appearance except in internal view of furcular facet where it is least like Otogyps too widely distant with the others.

Neogyps errans

Scapula

The scapula of Neogyps is distinguished from that of the other eagles (?) under consideration by the presence of a large pneumatic foramen in the lateral or external side of the blade immediately posterior to the proximal articular surface. Among the Vultures ~~Gypaëtus and Neophron~~ smaller ~~a foramen more nearly~~ of the same kind ~~dorsal position and~~ in ? there is a suggestion of a foramen in a similar position and in Gypaëtus there is a well marked foramen also on the external side but more dorsally placed. Neophron and Neogyps lack the foramina.

Another distinguishing character of the Neogyps scapula is the absence of pneumatic depressions on the ~~dis~~ proximal end In this character Neogyps resembles Gypaëtus

	a Gypaetus	b	ba
26 3rt.	22.2	14.7	66.2%
232	19.5	15.5	79.4%
227	14.3	9.7	67.8%
H6336	18.7	9.5	50.8%
E4594	19.0	10.9	57.3%
CV1164	20.5	11.9	57.0%
D1007	18.7	10.1	54.0%
CV664	19.2	10.7	55.7%
92	19.4	13.9	71.6

Coracoid measure Neogyps but placed alongside of Gyps shows separation to be near "?".

In this ratio, Neogyps is nearer Gypaëtus melanoleucus but in this ratio, only - not in other characters.

Neogyps errans

Humerus VII

	a length	? b breadth hyp ba	fhp cent	deltoid crest ca	d breadth dshp do
232 ✓	199.8	38.2 - 19.1%	34.9 {17.4% / 91.3	75.8 {37.9% / 198.4%	34.4 - 17.3%
263 ✓	241.9	Gypaetus 48.7 - 20.1%	46.3 {19.1%	91.8 {37.9%	39.3 - 16.2%
226 ✓	212.4	Oroaetus 37.5 - 17.6%	37.2 - 17.5%	78.8 37.5%	35.2 - 16.5%
227 ✓	145.7	Neophron 27.5 - 18.8	24.1 16.5%	54.2 37.1%	23.3 - 15.3%
		neogyps			
e 6416 ✓	215.4	39.85 - 18.4%	37.6 17.4%	77.2 35.8%	34.5 16.0%
ve 2946 ✓	208.2	37.2 - 17.8%	36.4 17.4%	73.8 35.4%	34.0 16.7%
ve 2118 ✓	205.5	38.0 - 18.4%	39.8 19.3%	70.9 34.9%	33.7 16.4%
ve v.1803	205.1	37.7 - 18.3%	38.7 18.8%	70.0 34.1%	33.6 16.3%
vb 8426 ✓	214.5	41.1 - 18.6%	38.7 18.0%	76.0 35.4%	36.6 16.1%
ve 4780 ✓	207.6	37.7 - 18.1%	36.5 17.5%	73.3 35.3%	33.7 16.2%
ve 4507 ✓	206.1	37.7 - 18.0%	34.8 16.8%	70.0 33.9%	32.7a 15.8%
vb 1997 ✓	202.8 -	37.2 - 18.3%	34.6 17.0%	71.8 35.4%	32.6 16.0%
291 ✓	226.4	41.8 - 18.4%		88.2 - 38.9%	38.2a - 16.8%

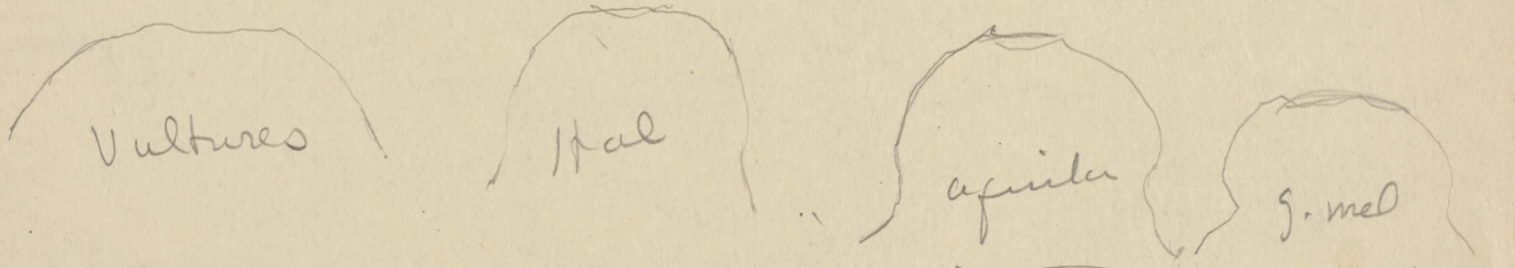
curved to here

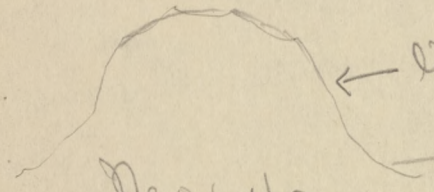
The curvature of the Neogyps humerus is greater than Gypaetus, Haliaeetus and Aquila but much less than G. melanoleucus, ~~Spagilis~~ - also less than Oroaetus; about as in ?.

Distal end - radial side - process is low - thus differing from G. melanoleucus & Aquila which have high process to breadth of distal end in Neogyps 5.5% to 5.9%; Gypaetus: 5.4%; Oroaetus: 5.1%; ?, 5.2%; Haliaetus, 5.7%; Aquila, 6.0 to 6.2%. Oroaetus & ? are not only too low but too broad and lack the indentation along the anconeal margin which sets the process out. Such an indentation is present in Gypaetus and the process is not too broad & is present for the entire length of the bone in Haliaetus. Thus, the Neogyps is not identical with Gypaetus in this character it is nearest to that genus. ←

Neogyps erranus
Sclerite girdle

One character which is apparently common to all of the Vulturidae is the broad arch from the posterior tip of one ischium around the posterior border of the ilium across the sacrum and around to the opposite side including ilium & ischium of this side. This arch is broad and evenly curved in the Vultures – It is narrow and comparatively even in Haliaëtus – narrow and uneven in Gy. mel and aquila. Neogyps





Summary: Neogyps is between G. mel – Aq. & Hal in some cases (closer to Hal) and like Hal & Vultures in 1. Distinct characters however set it apart from Hal. as a distinct genus.

Ilio-ischiatic foramen more distinctly outlined or outside in Vultures than in eagles! Neogyps eagle-like in this. Even Haliaëtus is more distinct, Neogyps, however is not as indistinct as Aquila or G. mel, – thus between Hal & these 2.

Ilium posterior to acetabulum with straight iliac crest in Vultures, slightly rounded in Hal., well rounded in G. mel and Aquila. Neogyps is between Hal & G. mel – Aquila.

The transverse processes show greater pneumaticity than in G. mel – Aq. ~ Like Hal & Vultures.

Neogyps errans
Fraser

	Length	Greatest breadth	Prox. post. ridge	Greatest length of tarsal plate	Across widest part of tarsal plate	Depth
	Neogyps					
226	112.8	23.4 (da 20.7)	28.7-25.4% (da 24.1-21.3%)	28.8-25.5% (da 24.2-21.4)	21.6-19.1%	26.0-23%
	112.4	23.1-20.5	28.7-25.5%	23.8-21.1	28.9-25.7	24.2-21.5	21.6-19.2	26.0-23.1
	Gypaetus					
263	125.5	25.9-20.6	32.3-25.7%	26.1-20.8%	40.2-32.0%	33.0-26.3%	26.7-21.2%	32.0-25.5%
	125.0		32.1-25.6	26.0-20.8	40.2-32.1	33.0-26.4%	26.7-21.1	32.5-26.0
	?							
232	104.3-20.1	19.2	26.1-25.0%	23.4-22.4%	28.9-27.7%	23.0-22.0%	20.0-19.1%	25.7-24.5
	Haliaeetus							
32	116.9-19.5	16.7%	26.3-22.5	24.3-20.7	33.5-28.6	26.0-22.2%	21.4-18.3%	26.5-22.6%
291	126.1	22.6	29.9-23.7	28.2-22.3	35.4-28.0	28.9-22.9%	23.6-18.7%	31.3-24.8%
6762	113.4	Aquila 19.7	26.2-23.1%	23.2-20.4%	31.2-27.4%	25.6-22.5%	20.8-18.3%	25.9-22.8%
9098	103.4	17.3-16.7%	23.4-22.6%	21.0-20.2%	26.8-25.1%	21.0-20.2%	18.9-18.2%	23.8-23.0%
3212	106.9	17.5-16.3%	23.5-21.9%	21.8-20.3%	26.1-24.4%	20.1-18.8%	17.8-16.6%	22.2-20.7
4212	106.3	17.6-16.5%	24.4-23.8%	21.5-21.1%	27.6-26.9%	21.4-21.0%	19.4-18.2%	23.6-23.1%
V471	131.9-17.9	13.5	28.4-21.5	27.1-20.5	34.7-26.3	30.7-23.2	23.2-17.5	29.5-22.3
	Neophron							
227	70.8	13.4-18.9%	17.6-24.8%	15.5-21.8%	20.9-29.5%	16.4-23.1%	14.2-20.0%	17.9-25.2%

In general the genus Neogyps resembles the Vulturidae. This is particularly marked in the presumed sculpture where the forlaudendaldag fossa has a tendency to flare on the anterior side causing the fossa to be of greater antero-posterior depth than in Aquila or Haliaeetus. Also the ridge is considerably shortened extending as a prominent flaring crest to a point immediately distal to the pneumatic foramen where it is noticeably indented. Distal to this point there is no distinct ridge tho the muscle scar continues on as in the eagles. In the latter the fossa ridge is of equal extent to the muscle scar. Neogyps resembles Gypaetus least, but is not identical with any of the three genera. Nor is it identical with Haliaeetus tho in 4 ratios it is nearer this genus than any other.

Tarso-metatarsus

This element has been described by Miller. The following discussion is by way of addition. ~~Miller notes that the hypotarsus is best developed in Neogyps, archaeotes~~ Miller remarks that one of the cultrid characters of Neogyps is the weakness of the hypotarsus. After a study of specimens of Tarsus of Aquila Haliaëtus Geranoaëtus, Neogyps, Gypaetus, Neophron and sp.?, it is the present writer's opinion that the distinctive feature of the cultrid hypotarsal region is not so much the weakness of one of the calcaneal ridges (in Neogyps both are large) but the smallness of the other and the closer proximity of the two ridges (as judged from the lessening in size of the canal between). This lessening in size is brought about by the narrowing of the shaft between (distal to the ridges) so that a decided convexity may present.

This limiting the size of the flexor tendons with regard to this character Neogyps is immediately set apart from Aquila and Geranoaëtus. However it exhibits none of the convexity characteristic of the cultrines, but more closely approximates Haliaëtus.

Another point of dissimilarity between Neogyps & the cultrines lies in the relative size of the median trochlea. In the cultrines this trochlea is enlarged indicating a large digit 3

Neogyps errans

Talso - metatarsus cont'd - 2.

Neophron - Concave in region of tubercle - raised on both ext. and int. borders. This central concavity extends to region of foramina, deepening here,

Aquila - Shaft slants from ext. to int. border with tubercle forming slight ~~obstruction~~. Slight indentation int. to tub. extends to foramina, broadening and deepening - a longer, narrower depression than in Neogyps.

Haliaeetus - Shaft ridged from ext. border to tubercle, then ~~int~~ back obliquely before continuing to int. border. Region of foramina slightly depressed - foramina on a slant - thus differing from other Gps. examined.

G. mel. - External border high and sharp. Shaft slanting slightly to tubercle, int to which is a groove like depression followed by a slight rise before shaft slants off to int. border. Foramina lie in a broad rounded pit, deep depression, bounded by the sharp ext border and the slight rise near the external border - above mentioned

---

Muscle ridges at proximal end absent in Deltoid, Present in eagles and Neogyps. Placed int. to foramina with border of depression continuous from median one distally - thus like Aquila rather than G. mel in which the border of the depression comes between the two ridges are int to the foramina (the median one being almost over the foramen of that side), and Hal in which there is no definite boundary to the depression and the median ridges is, proximally a point between the two foramina.

Neogyps Jaws contd 3

Inner calcaneal ridge more nearly central at distal attachment to shaft than in Ger., Hal or Aq. resembling Vultures in this respect, the lacking the rise in the shaft which in the Vultures occurs between the two ridges of the hypotarsus continuing on a little distance distal to their distal extremities. The only approach to this latter condition is in a shaft of Aq. which is slightly convex on the ext. side as contrasted to flat or concave shafts of Hal, Aq. & G. mel.

Distal end - Internal and median hallucal longer than external in Neogyps. Int & median nearly same length - with a slight variation of a longer internal.

Gypaetus - ext. shortest - median decidedly longest

"?" - ext. decidedly shortest - median & int. about the same tho with a tendency for longer int.

Oroygps - ext. decidedly shortest. Int. & median same as above

Neophron - ext. shortest. Int & median about same - tendency to longer median.

Aq. ext shortest - Int & med. same as Oroygps.

Hal. - Ext. shortest - med. next. int. longest about evenly spaced.

Ger. same as Aq.

Neogyps errans

Tarso-metatarsus (continued)

Ratio a: Between Gypaetus and Haliaëëtus; ratio b: Otogyps; ratio c: Gypaetus; ratio d: "?".

Tibialis anticus – size and position:

Neogyps: Very prominently raised; lateral (ext.)
Gypaetus: Not so prominent. Central
"?": Prominent (bet. Neogyps or Gypaetus); lateral (ext.
Otogyps: insignificant; central
Neophron: " "
Aquila: Not quite so prom. as "?"; lateral (ext.)
Haliaëëtus: Like Aquila; lateral (ext.)
Gyrnel: Very prominent; lateral ext.

Excavation of shaft at tibialis anticus (straight from tub. to ext. border)

Neogyps – Shaft slants away from tubercle to int. border with only a suggestion of an indentation – more pronounced in some individuals than in others, proximal to the tubercle, excavated around the foramina, deeply in some, less so in others.

Gypaëtus – Slight concavity in center where tubercle lies rising more on external border than internal. Excavation around foramina wider – not confined to the immediate vicinity of the foramina – extends almost to each border.

"?" – Region of tubercle about as in Neogyps; but proximally only faintly depressed – the bone having the appearance of being flat.

Otogyps – Faintly depressed across beg. of tubercle with a gradual slant from ext. to int. border. Proximally the foramina lie in a small but fairly deep depression.

Relationships of Neogyps

Cranium – no good individual – eagles
Beak – eagles – (Haliaeetus)?
Mandible – eagles
Sternum – vultures
Coracoid – vultures – not neophron
Scapula – ~~vultures~~ Gypaëtus (and Aquila – Geranoaetus)
Humerus

Ulna – Vultures
carpo-metacarpus – individual
pelvis – Haliaëtus – vultures
femur – vultures – eagles (Haliaëtus)
tibiotarsus – vultures with some eagle-like modifications
tarsus – vultures – eagles

radius
fuerda

66
151 | 970
604
640
76
151 | 1120
1057
630

93
40 | 373
360
150

Neogyps

genetic

sternum - vulture

furcula - vulture (not as bulky)

coracoid — vulture

scapula - vulture in 1, eagle in 1

humerus —

ulna — vulture

radius

carpus — ?

pelvis — intermed. ? more eagle.

femur — intermed, more vulture

tibia — intermed in 1, more vulture; eagle in 1
intermed in another

tarsus - chars. both ways

environment or habit

cranium — eagle

rostrum — eagle

mandible — eagle

tarsus —

Neoplecostomus	Breadth pectoral / Length	Length / Breadth pectoral	Beak Breadth act. nares	Breadth / Breadth nares	Depth act. nares	ba = rel br.	ca rel depth	ca / ba
F 1966	22.4		13.8		8.3	61.6	37.0	
F 1939	22.0	14.4	13.7		8.0	62.2	36.3	
F 1994	24.0		14.4		8.1	broad		
F 1990	20.0		12.3		8.3			
F 1925	1.0 23.0 –		14.4?		8.1			30.4
D 61	22.3		13.6		8.8			
Cath. sp.	21.5		14.6		9.8	68.0	45.4	
Neoplecostomus	22.5 24.7		14.7		9.9	59.6	32.0	
D 1076	10.2 36.7	14.4	19.7	10.2	22.3	broad 53.4	+ 60.7	– 29.7
J 9063	34.3		18.7		20.5	broad 54.5	+ 69.7	
H 9062	35.4?		19.5		22.1			
C 8471	33.9		18.2		21.1			
Urubitinga								
738	6.5 21.1	12.2	12.2		13.2	broad 57.8	+ 62.5	30.5
Otocaspo								
224	11.1 41.3		22.8 22.2		20.1	~~broad~~ 56.1	– 48.6	long 26.8
Aguila								
926	10.5 28.4	19.4	16.9	10.2	19.0	broad 59.5	+ 66.8	31.6
Hypostomus								
263	12.5 44.4	20.5	21.8	10.0	19.5	narrow 49.0	– 43.9	long 28.9
Neoplecostomus								
227	6.2 ~~29.0~~ 28.5?		17.0	9.7	6.1	narrow ~~54.0~~	– ~~23.9~~	long 24.3
Geneanodus								
233	8.7 28.0	17.7	18.3	8.5	15.9	broad 65.3	– 56.7	short high 31.0
Gal.	9.0 29.0	14.8	12.0	7.0	20 ÷ 15.8?	narrow 41.3	+ 62.0	short high 31.0
Hp. ?,	39.0		22.5		24.5	57.6	55.1	

Neogyps vs. Palaeobarus

~~Mandible~~ Beak (including mandible

width patient symph. (retaled)	length symphysis	length post. border nares (crested M	length gape border nares	width at post border nares	width ant. border nares
			0.029	0.018	0.012 Pal
0.010	0.016	0.042	0.0 ~~35~~ 34.3		0.0 ~~18~~ 15.4 neogyps
0.0 ~~16~~ 15	0.0182		0.0239		0.013.4 Neogyps

Depth at ant. border nares

0.020 - Pal

0.030 - Neogyps

0.010 Neogyps

Ratio

Breadth & ~~length~~ beak = ~~71~~ 1.3% for Palaeobarus

= 62-64 Neog

= 34-57 vultures

57

= 68 — 84 eagles

63

63

23.9 - 13.4

215 | 13.70
1290
800

239 | 1340 6
1095

29 | 160 5
145
150

5

20.2 | 1140

51

215 | 1110
1076 10
34 127

43

202 | 1210
1206
640

30 | 120 4
120

85

39 | 3000
2800
200

70

29 | 2000
203
333

30 | 100 3
90
100

Element	Neogyps Max.	Neogyps Min.	Neogyps Av.	Otogyps	Vulturidae sp.?	Gypaetus	Haliaëetus	Aquila	Geranoaetus	Neogyps
Sternum (Breadth ventral lip of sulcus)	48.8	43.7	46.2	52.1	52.9	72.1	1 44.1 2 46.5	1 42.1 2 47.2	39.8	
Coracoid	69.9	65.9	67.9	77.8	73.8	88.3	1 68.7 2 74.6 96.9	1 63.8 2 72.1	61.2	
Humerus	217.6	202.8	210.2	212.4	199.8	241.9	1 195.0 3 226.0	1 180.8	159.9	
Ulna	251.7	236.0	243.8	274.9	280.2	275.0	1 264.1 236.0	1 211.0 2 223.0	189.2	
Carpo-metacarpus	111.5	98.4	104.9	107.6	106.3	122.6	1 119.7 106.8	1 99.9 2 103.4	87.6	
Femur	113.4	103.4	108.4	112.4	104.3	125.0	1 112.2 2 116.9 3 126.1	1 124.6 2 131.9	111.9	
Tibio-tarsus	153.6	140.9	147.2	158.9	159.4	170.9	1 166.0 148.5	1 160.1 2 163.4	153.4	
Tarso-metatarsus	93.0	84.0	88.5	95.5	108.4	99.5	1 87.9 3 97.6	1 101.0 2 99.9	114.4	
Ratio of femur to humerus	52.1%	50.9%	51.5%	52.9	52.2	51.6	1 57.5% 1 55.7	68.9%	69.9%	
Length of leg	360.0	328.3	344.1	366.8	372.1	395.4	3 390.7 347.6	385.7	379.7	
Length of wing	580.8	537.2	558.9	594.9	586.3	639.5	3 609.8 545.2	491.7	436.7	
Ratio of length of leg to length of wing	62.1%	61.6%	61.5%	61.6%	63.4%	60.2%	64.0% 63.9%	78.4%	87.0	
Ratio of length of coracoid to length of leg	19.4	20.0	19.7	21.2	19.8	22.3	19.7	16.1	16.1	
Ratio of length of coracoid to length of wing	12.0	12.2	12.1	13.0	12.5	13.2	12.6	12.9	14.0	
Ratio of humerus to ulna	86.4%	85.9%	86.1%	77.2%	71.3%	87.9%	85.5%	85.6%	88.0%	

Ibidorhynchus - Neogyps

		Distal end				
		br.	depth	%	depth	%
Neogyps	3a				10.5	15.0
8326	Nat	13.9	15.7	70.4	16.1	71.2
		22.2				
2320	to	19.1	15.0	78.6	15.0	78.6
5047	Sag.	22.6	16.5	73.0	14.7	65.1
2266		20.2	17.1	84.6	15.7	78.1
2263		22.4	19.6		17.2	77.4
C 52	18	20.0	13.8	69.0	13.3	67.4
D 1091		19.5	13.5	69.3	12.8	65.7
C 8431		18.0	12.7	70.6	12.8	71.4
D 3513		19.2	13.1	68.3	13.2	68.8
169-5044	a	12.6	9.1	72.1	9.2	73.0

The depth rel to the breadth of the dist. end in Neogyps is as in the eagles, altho the indivs fall in with Neophron, whose depth is less than the average for the vultures + Halitherax

The angle of the supratendinal bridge is intermed - more vertical than the vultures, more horiz. than the eagles. No nearer Hal. than the others.

Prox. end: Intermed. crural crest in vultures from. prox. but short and narrowing abruptly Eagles longer narrowing gradly. Neogyps more like the vultures in the abrupt narrowing but has slight continuation down shaft which the vultures lack

~~Better description already typed.~~ No closer to Hal than any other eagle in this element

Meas. inside of Deltoid ridge

Eagle humerus

Length of Deltoid ridge

Length from caput

Breadth of distal end

Neogyps errans

Breadth proximal end

Height proximal end

Laguna June '27

Breadth proximal end

B	8477	218.7	79.7	77.8	35.3 a	39.6 a	21.3 -	39.8	2.8
C	6716	215.4	77.7	76.7	35.1 a	40.0 a	20.7	39.7 -	2.3
B	8426	214.6	77.3	74.8	36.9 -	41.0 -	20.2	39.6	2.7
C	4780	207.6	74.1	72.5'	34.2	37.8	18.9	36.6	2.7
C	4507	206.3	70.7	69.5'	33.2	37.7	18.0 a	35.3	3.2
C	1803	200.4	70.4	69.1	34.6 -	37.5'	18.4	40.5' -	3.2
C	2118	205.4	72.3 -	70.4	34.4 -	37.8 -	18.9 -	39.8 -	2.7
C	1997	202.6	71.6 -	70.0	32.5 a	36.9	18.3	38.7 -	2.3
C	4549	198.9	69.5'	67.2	33.0	36.5'	18.8 -	36.3 -	2.4

Neogyps errans
1928 - Howard

Palaeoboas

Humerus - Similar to Neogyps + Neophr. in presence of depression at dist end of median crest, actual shape of depression closer to Neoph. (broader + shallower in Neogyps) a depression found in Neophron + a shal deep one in Aquila

Dep. absent in Gyps + Neogyps

Brachial depression in dist end deep as in vultures, resembling Neogyps + Neophr.

Head rel. broader (ant post) + shorter (transversely) length about as in Neoph, but head higher

Breadth of dist end 28 mm. (23.7 max in Neoph., 32.7 min. in Neogyps)

But. post. head = 10 mm (10.2 for Neogyps, 8.9 Neoph)

Trans. diam of prox. end = 32 mm (± 40.8 for Neogyps and 24-30.5 for Neoph.)

Depth of head rel to breadth

Pal. = 31.2%

Neog = 25.0 "

Neoph = 29.1 "

~~On the flare of the dist end~~

40.8
32
46.8

28.0
23.7
4.3

32.7
28.0
4.7

32.0
30.5
1.5

Tibio tarsus

Sesamoid bridge

less inclined toward the vertical in Pal. than in the eagles, sarcs & Vultures, Neog, Neoph,

Distal end Pal

Trans. diam 16

ant. post ext 12 = 75%
int. 13 = 80%

ratio with breadth = vultures

Vultures = ext 71.9 – 77.4
int. 72.6 – 85.5

eagles = ext 62.3 – 69.5
int. 63.0 – 67.9

Neogyps = ext 65.4 – 70.7
int. 68.3 – 73.0

Neoph. = ext. 75.3 – 82.2
int. 77.5 – 84.0

Breadth dist end
Neog. smallest 18.1
Neoph largest 15.0
Gyp, 18.5

ap. length Pal 124.7mm. (from illus.)

Breadth of dist end less than eagles (rel to length =12.8, eagle = 13.2 – 14.9
vultures = 12.0 – 13.0
Neog. = 12.7 – 14.0, Neoph = 11.3 – 12.5

Prox end

Trans. diam ~~20~~ 16 (20 = to crumpled crest)

ant post. 17

Much shorter than Gyp. Neog. Longer than Neoph,

	Coragyps ratio %	Cathartes Ratio %	Gymnogyps %
Breadth dist.	12.7	11.6	11.4 10.1	23.0 = 10.8
depth ext	12.7	100.%	10.9 – 93.9%	21.9 – 95.3
" int.	10.7	107.8	11.3 – 97.4%	22.2 – 96.6
Length	146.6		115.6	length 213.1

Cath
short
broad
Mine do not agree with any spec, maybe meas. wrong

The distal end of the tibia is diagnostic in the relative depth of the ant. & ext. condyles rel. to the breadth of the dist. end. Where ratios are presented below;

	ext	int
Pal.	75%	80%
Vultures	72-77%	72-85
eagles	62-69	63-68
Neogyps	63-70	68-73
Neoph.	75-82	72-84
Cathartes	94	97
Coragyps	100	107

~~In this element there~~
The tendinal bridge is less inclined & the vertical in Pal. than in the eagles, ~~Aquila~~ resembling the vultures. Also there is only one tendinal bridge, thus differing from Polyborus.

The fibia there is an imp. element of the skeleton of Pal. in the classification of that species.

	Cath.	condor	Palaeotaus
med. cond. 9.9	8.5	15.2	
h. dist. 16.9	17.6	28.3	
ratio 58.5%	58.2%	53.7	

Taosus

Paleotaus dist. cond. only a little larger than median one.

		Pal of Neag/Bb Mt 7, Mt. 9 Mt 5a				
Trans. diam mid shaft	10	11.4	11.6	10.6	12.6	9.8 10.6
ant post " ext side	9	11.1	9.7	9.6	9.3	11.0 9.
trans " dist	19					
ant. post " med. condyle	10					

The vulturine char. of a rel. ~~small~~ large median condyle (tr.dj 13) and a rel. small ant. cond (tr.dj .2) occurs in Pal. The ratio of the former to the breadth of dist. end = 51% (equiv. to Otogyps.)

vultures = 44-51
eagles = 38-41
Neag = 39.8-42.9
Neoph = 43.4-45.6

The actual meas of the ant. condyle cannot be made from the illus and is not given, but its small size was sufficiently noticeable for Dr Lepe to comment upon it as follows: p 294 "of the three distal condyles, the internal has less transverse extent than the corresponding one in A. chrysaetos being but little wider than the median condyle. It terminates in the usual post-acumination"

This comparison would have been of the ant. post diam.), as Dr. Lepe's meas must have been on the post side since from the position of this condyle it would seem that an ant.-post meas. was necessary. This does not

also that the ant. cond was notably smaller than in Aquila

Neogyps errans
tibio-tarsus
ratios lettered a to f

	a Length	b Breadth (6a)	c Depth (8) %	d depth inside	e breadth (29)	f depth
263 rt.	170.9	24.3 - 14.2 %	31.7 - 18.3 %	17.6 - 10.2 %	22.0 - 12.8 %	16.4 - 9.6 %
263 lft	170.9	24.4 - 14.2 %	31.6 - 18.4 %	17.8 - 10.4 %	22.3 - 13.0 %	17.2 - 10.0 %
232 lft	159.4	20.5 - 12.2 %	23.5 - 14.7 %	15.3 - 9.5 %	19.2 - 12.0 %	14.8 - 9.2 %
Orogyps						
226 rt	158.9	20.1 - 12.6 %	26.0 - 16.3 %	17.2 - 10.8 %	20.1 - 12.6 %	15.6 - 9.8 %
Nephron						
227 rt.	116.9	13.5 - 11.5 %	17.2 - 14.7 %	10.6 - 9.0 %	14.6 - 12.4 %	10.5 - 8.9 %
Haliaëëtus						
291 rt.	166.0	23.2 - 13.9 %	28.9 - 17.4 %	16.3 - 9.8 %	24.0 - 14.4 %	16.7 - 10.0 %
Aquila						
421 lft	168.4	23.9 - 14.0 %	28.5 - 17.4 %	15.7 - 9.6 %	23.1 - 14.1 %	14.7 - 8.8 %
Neogyps						
B9302	153.6	20.5a - 13.3 %	23.4a - 15.2 %		20.8 - 13.5 %	
D 610	141.6	18.8a - 13.2 %	22.5 - 15.8 %	13.2 - 9.3 %	18.1 - 12.7 %	12.8 - 9.0 %
C 4982	148.9	20.8 - 13.9 %	23.4a - 15.7 %	14.6 - 9.8 %	20.0 - 13.4 %	13.5 - 9.0 %
D 1091	145.2	21.2 - 14.5 %	24.1 - 16.6 %	13.4 - 9.2 %	19.6 - 13.4 %	12.8 - 8.8 %
D 3531	148.5	20.5 - 13.8 %	24.0 - 16.1 %	13.2a - 8.8 %	19.5 - 13.1 %	13.2 - 8.8 %
D 3492	140.9	19.9 - 14.1 %	22.8 - 16.1 %	13.6 - 9.6 %	19.2 - 13.6 %	12.8 - 9.0 %
C 5218	145.0	21.0 - 14.4 %	24.2 - 16.6 %	14.1 - 9.7 %	19.8 - 13.6 %	13.3 - 9.1 %
C 2199	146.2	20.6 - 14.0 %	23.0a - 15.7 %	14.2 - 9.7 %	20.5 - 14.0 %	13.0a - 8.8 %

Ratio a: Gypaetus + Aquila (+Hal.); ratio b: Orogyps; ratio c: ?; Nephron (?), Hal. + Aquila; ratio d: Gypaetus (+Hal. mel); ratio e: Nephron, Aquila and possibly ?; f: Neophron. g: Neophron, Hal., G. melanoleucus (?); h: ? and G. mel.

Further ratios: b = breadth to length; c = depth to length; d = inside depth to breadth; g = outside depth to Breadth. R = round head to depth

	b	c	R
263 rt	79.8 %	77.1	77.2
232	79.6 %	77.0	87.2
226	85.5 %	77.6	77.3
227	72.6	71.6	78.3
291	67.9	69.5	80.0a
421	67.9	62.3	83.8 %
B9302			87.6 %
D 610	72.9	70.7	83.5 %
C 4982	73.0	67.5	88.8 %
D 1091	68.3	65.3	87.9 %
D 3531	67.6a	67.6	85.4 %
D 3492	70.6	66.7	87.2 %
C 5218	71.2	67.1	86.7 %
C 2199	69.2	63.4a	80.4a %
mel 233	68.0	67.4	87.5

H. Ilaeyaude
Horsa

Neagyho shell – La Brea

	a gr b	b lesser br	c AT	d br bet temp scars	ba	eb	ea	db
retired	76.0?	48.9	43.5	33.2			57.3	68.3
C1196		46.2	39.5	30.2				64.5
C9466	78.	49.1	42.1	31.2			54.0	63.5
B8423	78?	47.2	38.5	32.2			60.4	68.2
C1201	—	48.3	—	33.0				68.5
C9999	—	47.5	—	26.6				55.7
C2617	—	47.3	41.2	35.4				75.5
186	73.5?	"	42.1				57.3	

process

Size of Neogyps.

Cranium
Gypaetus
Hal ?

Beak
Intermediate between Hal (large) + Aq. (small

Mandible
Ger., Aq. Hal

Sternum
Hal. Aq.

Coracoid
Aquila
?
} not likely either but nearer

Scapula
?, Hal. Aq.

Humerus
?, Neogyps

Carpus
?, Orogyps, aquila

Femur
?, Orogyps

Tibia
Gerandoaetus

Tarsus
Orogyps
Hal.
Neophron (very ?)

Ger.	Hal.	Aq	Oro, Neo.	? Gyp.
11	IIII	IIII	IIII I	III I
	1	1		1

1011
1053
1106
1001
2)2117
1058
1106
2)3170
1056

11,25
,10 ,4

,134a) 1.1100 (3
4020
6180

11.2500
107972

1340.) 1.4028 (33
4020
5800
4020
1780

112500
107972

,1340) 4528 (338
4020
5080
4020
10400
9920

2394
,2394
9576
21546
7182
47788

.057131236 +0

45'7612
44916 6

44047) 1.84466 (13
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